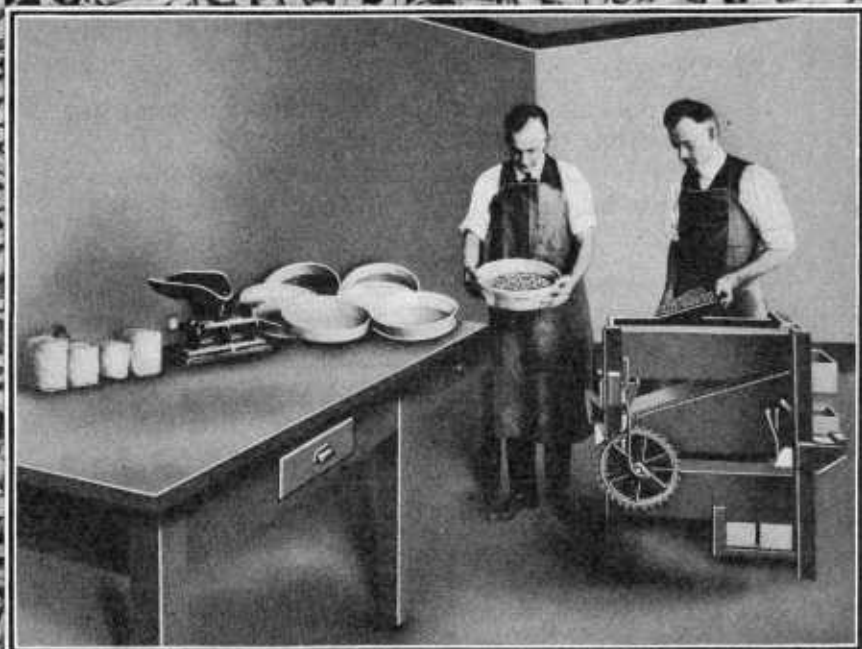


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DOCKAGE UNDER THE FEDERAL WHEAT GRADES



SOME DOCKAGE MAXIMS

THE PERCENTAGE OF DOCKAGE is an essential factor in arriving at the true value of a lot of wheat. This dockage may consist of either useful or harmful foreign materials.

The various methods of handling dockage should be carefully investigated and the one that is best suited to the needs of the local conditions should be adopted.

When a large percentage of dockage is present in wheat it is advisable to remove it on the farm or at the point of shipment and thus avoid paying the freight for the dirt, chaff, weed seeds, etc., on the basis of the rate for wheat.

The farmer should get a higher numerical grade for his wheat under the dockage system of the Federal grades than he would under a system of grading that does not require a determination for dockage but lowers the grade on account of the total foreign material present in the wheat marketed at country points.

The dockage system in operation protects the farmer from the possibility of low prices fixed by the local buyer in order to insure a safe purchase on a flat-rate basis.

Contribution from the Bureau of Markets
GEORGE LIVINGSTON, Chief

Washington, D. C.

March, 1920

DOCKAGE UNDER THE FEDERAL WHEAT GRADES.¹

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DOCKAGE DESCRIBED.

IN GRADING WHEAT under the Federal standards one of the fundamental principles is to determine the numerical grade on a dockage-free basis; that is, the dockage is first removed from the sample and the grade determination is made on the clean or dockage-free wheat. A few exceptions to this principle are noted in the following pages.

What is dockage? It is the foreign material screened from a sample of wheat to be graded, by the use of appropriate hand sieves (see fig. 1), or other cleaning devices, such as those approved by the United States Department of Agriculture. It consists of sand, dirt, weed seeds, weed stems, chaff, straw, grain other than wheat, any other foreign material, and in certain cases some finely broken and small shriveled kernels of wheat.

The purpose of the dockage provision in the wheat standards is to enable the person grading the representative sample to determine the

¹ The method of determining dockage in wheat recommended by the Department of Agriculture in Farmers' Bulletin 919 was based on the official grain standards of the United States for wheat made effective on July 1, 1917, for winter wheat and on August 1, 1917, for spring wheat. The official grain standards for wheat of all classes were revised, effective July 15, 1918, and this publication sets forth the recommendations of the department on the determining of dockage under the revised grades.

approximate amount of easily separated foreign material that is in the lot of wheat. Dockage is therefore approximately the percentage of foreign material which can be readily removed from the lot of wheat by the ordinary commercial types of cleaning machinery commonly found in grain elevators and mills.

The dockage test is made ordinarily by weighing about 1,000 grams of wheat (about $2\frac{1}{4}$ pounds), which should constitute a representative sample. Grams are used instead of other units for ease in determining percentages.

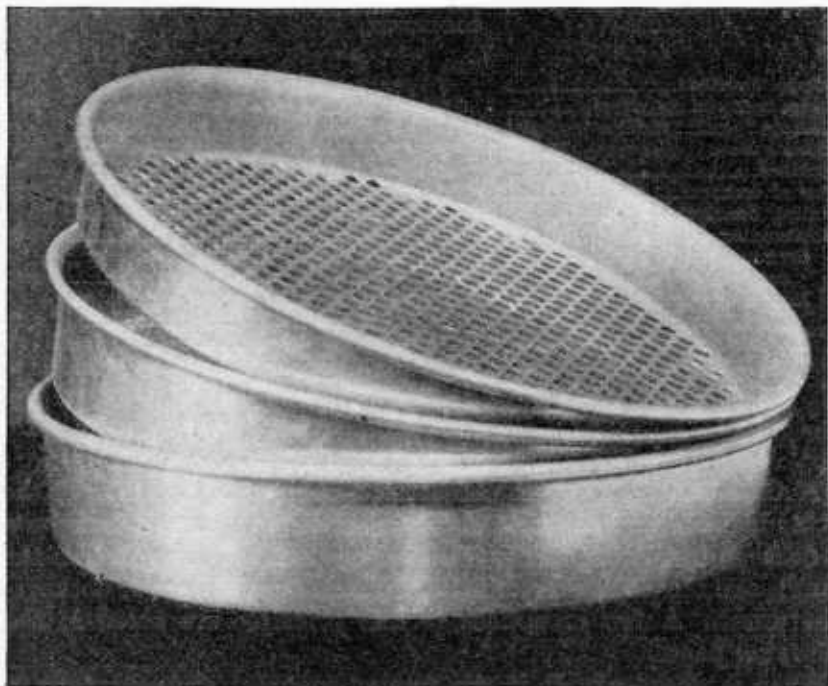


FIG. 1.—Nest of two hand sieves and bottom pan, for separating dockage from wheat samples.

The dockage is separated from this 1,000-gram sample by screening with the proper hand sieves (fig. 1) or by using an approved cleaning device such as is described under the heading "Detailed description of the method of determining dockage." The dockage so separated is weighed and the percentage is found, based on the total weight of the sample including the dockage. If the amount of dockage is below 1 per cent it is disregarded. For example, if only one-half of 1 per cent of foreign material is so separated no dockage is assessed. This one-half of 1 per cent, however, would not be returned to the sample used in determining the grade. If $1\frac{1}{2}$ per cent of dockage is separated, 1 per cent of dockage would be indicated in assigning the

grade. Therefore, it will be seen that any fraction of a per cent of dockage is considered as a "tolerance" in the standards.

After the dockage is removed the clean sample is used in determining the grade, save for the few exceptions to be noted. Dockage does not affect the grade assigned to the wheat. If 1 per cent or more of separable foreign material is found, dockage is assessed. In inspection certificates it is indicated immediately after the statement of the grade designation, as "No. 1 Northern Spring, dockage 1 per cent," "No. 1 Northern Spring, dockage 2 per cent," "No. 2 Red Winter, dockage 1 per cent," etc.

FOREIGN MATERIAL IN WHEAT.

The foreign material usually found in wheat may become mixed with the wheat while growing, or with the grain at the time of thrashing, or in the elevator or other place of storage during the various processes of handling or marketing. The presence of foreign material in wheat at the time of thrashing may be the result of impure seed, or of certain weather conditions which are unfavorable to the growth of wheat plants but favorable to the growth of weeds. If the seed is carefully selected, cleaned, tested, and treated before planting, if care is exercised in the cultivation and crop rotation, and if the wheat is carefully thrashed and cleaned at the time of thrashing, there should be ordinarily very little foreign material present when the crop is marketed. The foreign material in wheat may seriously affect its value in that it often increases the cost of milling, and causes injury to the baking qualities of flour. Therefore, that factor is considered in the inspecting and grading of wheat. The amount of dockage present has a bearing upon the commercial value of a lot of wheat. Especially when present in large amounts, it is a factor of considerable importance to the parties interested in the marketing or storage of grain.

"DOCKAGE" AND "FOREIGN MATERIAL OTHER THAN DOCKAGE" DISTINGUISHED.

There are two terms in the Federal wheat standards which apply to foreign material—"Dockage" and "Foreign material other than dockage." "Dockage" is the foreign material that is separated from the sample of wheat by the correct use of appropriate hand sieves. "Foreign material other than dockage" is the foreign material that is not separated in the screening and remains in the dockage-free sample. "Dockage" does not affect the grade, but sometimes does affect the weight of the wheat to be sold. "Foreign material other than dockage" is a factor in the grading, and definite percentages are permitted within each numerical grade.

In grading the dockage-free sample of wheat, the factor "Foreign material other than dockage" (see columns 9 and 10 of the tables on page 24) is further considered under two headings, namely: "Cereal grains" and "Matter other than cereal grains." "Cereal grains" include rye, barley, emmer, spelt, einkorn, corn, grain sorghums, oats, and rice only. "Matter other than cereal grains" includes weed seeds, buckwheat, flaxseed, wild oats, and dirt. A certain total limit, which includes the entire amount of this foreign material in the dockage-free sample, is specified for each grade. Within this total, however, the "Matter other than cereal grains" (weed seeds, etc.), has a special limitation. The percentage of weed seeds permitted within each grade is smaller than that for "Cereal grains" because the former more seriously affects the milling value of wheat than does the "Cereal grains," and these weed seeds may have ingredients which are positively harmful.

Referring to the heading "Foreign material other than dockage" in the tabulated and abridged grade requirements for the Federal grades on page 24, a few examples will be cited to illustrate the grade requirements:

1. If the foreign material in the dockage-free sample of wheat consists of rye and small oats kernels only (cereal grains): 1 per cent is permitted in Grade No. 1, 2 per cent in Grade No. 2, etc. (See "Total" column.)

2. If the foreign material in the dockage-free sample consists of chaff (cheat) and cockle only (matter other than cereal grains): $\frac{1}{2}$ per cent is permitted in Grade No. 1, and 1 per cent in Grade No. 2, etc. (See "Matter other than cereal grains" column.)

3. If the foreign material in the dockage-free sample consists of rye (cereal grains) and cockle (matter other than cereal grains), and if $\frac{1}{2}$ per cent is cockle, then only $\frac{1}{2}$ per cent may be rye for the Grade No. 1, as the total foreign material for this grade must not exceed 1 per cent. If $1\frac{1}{2}$ per cent is cockle, the sample will grade No. 3 on account of the factor "Matter other than cereal grains," and the rye in this case must not exceed $1\frac{1}{2}$ per cent, as the total limit for the grade is 3 per cent.

Cereal grains and matter other than cereal grains may be either "Dockage" or "Foreign material other than dockage," and the classification under the Federal grades depends on whether the material is separated from the sample by the use of the appropriate sieves. If separated, it is classified as "Dockage." If it is not separated, it becomes a factor in the grading under the heading "Foreign material other than dockage." (See figs. 2 and 3.)

Ordinarily the foreign material classified as dockage can be removed from the wheat with comparatively simple cleaning machinery, such as is installed in many of the grain elevators and mills, or it

can be removed on the farm with an ordinary portable fanning mill equipped with screens having perforations like those specified for the dockage sieves.

VALUE OF DOCKAGE.

Dockage found in wheat in many cases is of real value, while in other cases it not only may have no value but often may contain ingredients that are positively harmful if ground with the wheat.¹ Therefore the value of dockage depends on the value of the material separated from the wheat. Dockage frequently contains quantities of nutritious grain and weed seeds, as mustard, flaxseed, oats, or other cereal grains; much of this material can be used to good advantage as poultry feed or stock feed. Wild mustard and flaxseed can be removed from the dockage in practically a pure state by the use of special cleaning machinery such as is sometimes found in terminal elevators and the larger flour mills, and when so separated will command a good price. The farmer, of course, should receive a reasonable return for this valuable dockage.

However, when dockage consists of dirt, sand, and other material of no value, or of material containing ingredients that are positively harmful when ground with wheat, the dockage contained in the wheat amounts to a specific loss, when the entire lot is purchased for food purposes, and necessitates extra expense in cleaning the wheat to make it suitable for human consumption.

The farmer or grain dealer, of course, does not expect the purchaser to pay wheat prices for dirt, objectionable weed seeds, sand, chaff, weed stems, and straw. If the dockage system is not employed, such foreign material may cause a lowering of the grade. If no grading system is employed and the country miller or grain dealer buys wheat as delivered at a flat rate, or on the basis of the average quality delivered, the price paid is sufficiently low to protect him against loss caused by the objectionable foreign material delivered with the general run of the grain. Under the dockage system of the Federal standards, however, the amount of such foreign material separated and considered as dockage may be deducted from the weight of the wheat purchased, and in any event does not affect the grade of the clean wheat. This results in a higher grade and the price paid is on the basis of this grade for the dockage-free wheat. In other words, the grain dealer or miller who purchases wheat containing such foreign material does not pay wheat prices for dirt, etc., under any system of grading. Where the country buyer is obliged to sell his wheat, purchased from the farmer, in large markets where the Fed-

¹ The injurious effects on the milling and baking qualities of straight flour made from wheat containing various kinds of impurities are given in detail in United States Department of Agriculture Bulletin 328, "Milling and baking tests of wheat containing admixtures of rye, corn cockle, king head, and vetch," 1915.

eral standards are applied, it is desirable that he correctly apply these standards and the dockage system in his wheat purchases so that he may purchase and sell the commodity on the basis of the same set of grades.

Where the flat-rate method of purchase is followed, farmers with little or no dockage in their grain are often obliged to sell their wheat at the same price as wheat containing dockage. Therefore, where the dockage system is properly employed, the farmer or grain dealer who delivers grain with little or no separable foreign material in it receives full value for his wheat and is not obliged to take less than it is worth in order that other farmers or dealers may receive the same market price for wheat containing weed seeds and other objectionable separable foreign material. If the dockage system is properly employed, the purchaser can base the price upon the intrinsic value of the dockage-free wheat, and then take into consideration the value, if any, of the dockage present, as evidenced by the kind and amount determined and the expense incurred in separating it from the wheat.

DETAILED DESCRIPTION OF METHOD OF DETERMINING DOCKAGE.

CERTAIN FOREIGN MATERIAL DESIGNATED AS DOCKAGE.

In the revised Official Grain Standards of the United States for Wheat, fixed and promulgated by the Secretary of Agriculture on April 13, 1918, effective July 15, 1918, and published in Service and Regulatory Announcements (Markets) No. 33, a certain character of foreign material in wheat has been designated as "Dockage," which is defined as follows:

Dockage includes sand, dirt, weed seeds, weed stems, chaff, straw, grain other than wheat, and any other foreign material, which can be removed readily from the wheat by the use of appropriate sieves, cleaning devices, or other practical means suited to separate the foreign material present; also undeveloped, shriveled, and small pieces of wheat kernels removed in properly separating the foreign material, and which can not be recovered by properly rescreening or recleaning. The quantity of dockage shall be calculated in terms of percentage based on the total weight of the grain including the dockage. The percentage of dockage so calculated, when equal to 1 per centum or more, shall be stated in terms of whole per centum; and when less than 1 per centum shall not be stated. A fraction of a per centum shall be disregarded. The percentage of dockage, so determined and stated, shall be added to the grade designation.

HOW TO SECURE THE SAMPLE FOR INSPECTION.

In the inspection and grading of grain under the official standards it is important that the grading be done on the basis of a representa-

tive average sample of the lot. Section 7 (as amended) of regulation 5 of the Regulations of the Secretary of Agriculture under the United States grain standards Act outlines what is deemed a representative sample, as follows:

SEC. 7. For the purposes of an appeal or a dispute no sample shall be deemed to be representative unless it comply with the following requirements:

Paragraph 1. It shall be at least 2 quarts in size, of which at least $1\frac{1}{2}$ pints shall be inclosed in a clean air-tight container, and the remainder, if any, in a clean cloth sack.

(NOTE.—Many farmers and interior grain dealers prefer to place the entire sample in an air-tight container for mailing to an inspector. If this practice is followed, care should be taken to see that the container is clean and the wheat is dry and the time necessary for the delivery through the mails does not exceed a day or two.)

Paragraph 2. In case of bulk grain in a carload lot or in a wagon, at least five probes, and as many more as may be necessary, in the discretion of the sampler, shall be taken from the grain in different parts of the car or wagon, as the case may be.

Paragraph 3. In case of bulk grain in a canal boat, barge, ship, or other vessel, at least five probes, and as many more as may be necessary, in the discretion of the sampler, shall be taken from the grain at different points through each hatch or opening in the deck, except that, when it is impractical to obtain a sample in accordance with the foregoing portion of this paragraph, it may be drawn from the grain stream while running from the spout or on the belt or other conveyor to or from the vessel, if taken in such a way as to show an average of the entire lot.

Paragraph 4. In case of grain in sacks, samples shall be drawn from such number of sacks selected at random from the entire lot as will, in the judgment of the sampler, show an average of the lot, except that, if the grade of each individual sack be in question, a sample shall be drawn from each sack.

Paragraph 5. In case of grain in an elevator or warehouse, or in any other case not covered in this section, samples shall be taken from as many different portions of the lot or parcel as will, in the judgment of the sampler, show an average of the lot or parcel.

Paragraph 6. The grain taken from the different portions of a lot or parcel shall be thoroughly mixed, and such mixture, or a typical portion thereof, otherwise complying with this regulation, shall constitute a sample of the entire lot or parcel.

EQUIPMENT FOR SEPARATING DOCKAGE.

In determining the quantity of dockage in connection with the official grading of wheat the following cleaning devices are used in the offices of Federal Grain Supervision:

1. A small wheat tester or device for removing barley, oats, wild oats, pieces of straw, weed stems, and other coarse matter from wheat.

This is a modified form of the machine already in general use in the spring wheat belt, where the dockage system has been practiced for many years. On account of the peculiar short, jerky motion of the riddle, this machine has been popularly designated as the "wild oat kicker." (See fig. 4.)

2. Set of perforated metal hand sieves consisting of—

- (a) Bottom pan; inside diameter should be $13\frac{1}{2}$ inches; depth, $2\frac{1}{2}$ inches; and roll at top of pan three-sixteenths inch in diameter.
- (b) Buckwheat sieve, with triangular perforations eight-sixty-fourths inch on each side of perforations; inside diameter of sieve should be 13 inches; depth of sieve, 2 inches; and roll at top of sieve, one-fourth inch in diameter.
- (c) Fine-seed sieve, with round perforations one-twelfth inch in diameter. (Other specifications and dimensions same as for (b) buckwheat sieve above.)
- (d) Fine chess sieve, with slotted perforations 0.064 inch wide and three-eighths inch long. (Other specifications and dimensions same as for (b) buckwheat sieve above.)
- (e) Coarse chess sieve, with slotted perforations 0.070 inch wide by one-half inch long. (Other specifications and dimensions same as for (b) buckwheat sieve above.)
- (f) Scalper sieve, with round perforations twelve sixty-fourths inch in diameter, depth of $1\frac{1}{2}$ inches; inside diameter should be $12\frac{3}{4}$ inches; and roll at top of sieve five-sixteenths inch in diameter.

NOTE.—Sieves (b), (c), (d), and (e) should be made to nest very freely with the bottom pan. The scalper sieve (f) should nest very freely with each of the other three sieves and also with the bottom pan.

The shape and arrangement of the perforations in the different sieves are illustrated in figure 5, and the manner of nesting the sieves is shown in figure 1.

It is absolutely essential for the purpose of uniformity in inspection that the dimensions of the perforations of the sieves used be exactly as stated above. A slight variation in the dimensions materially influences the percentage of dockage obtained. In order to secure the exact size it is necessary that the perforations be cut with dies especially made for the purpose. Sieves made with an ordinary punch from tin or galvanized iron will not give accurate results.

From experiments in hand screening and cleaning various kinds of foreign matter from wheat, it has been found that with proper care the metal sieves with perforations as indicated above, when used in connection with the wild-oat separator, will give a practical determination of dockage.

HOW TO USE THE HAND SIEVES.

In determining dockage such sieve or sieves should be used as will remove the foreign material with the least possible loss of wheat including small plump, or badly shriveled kernels, or large pieces of broken kernels. As a general rule, the use of the fine-seed sieve with round perforations $\frac{1}{12}$ inch in diameter, together with the scalper sieve or the "wild oat kicker," will be sufficient. (See fig. 6.) However, if the sample contains an appreciable quantity of wild buckwheat, pigeon grass, or other seeds of a similar character, or foreign material, none of which will pass through the fine-seed sieve, then the buckwheat sieve should be used. (See fig. 7.)

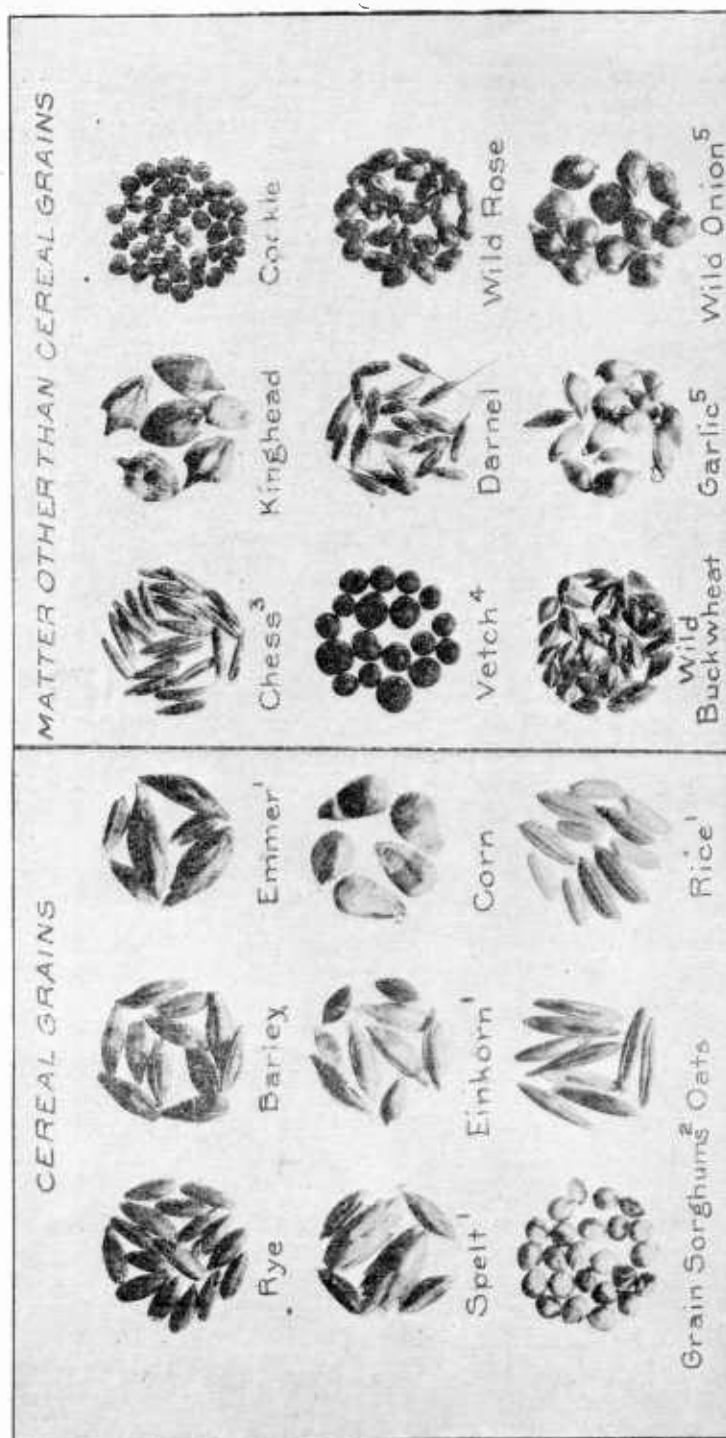


FIG. 2.—Foreign material partly illustrating the grading factors "Cereal grains" and "Matter other than cereal grains" (actual size). Whether this material is considered as "Dockage" or "Foreign material other than dockage" depends upon whether it is separated by the appropriate sieves. If separated it is "Dockage"; if not separated, "Foreign material other than dockage," and is a factor in the grading. 1, Hulled and unhulled kernels; 2, grain sorghums include kafir corn and milo maize; 3, chess (cheat); 4, includes hairy vetch and common vetch; 5, wheat containing garlic or wild onion bulblets in a quantity equal to 1 or more bulblets in 1,000 grains causes it to be graded "Garlicky."

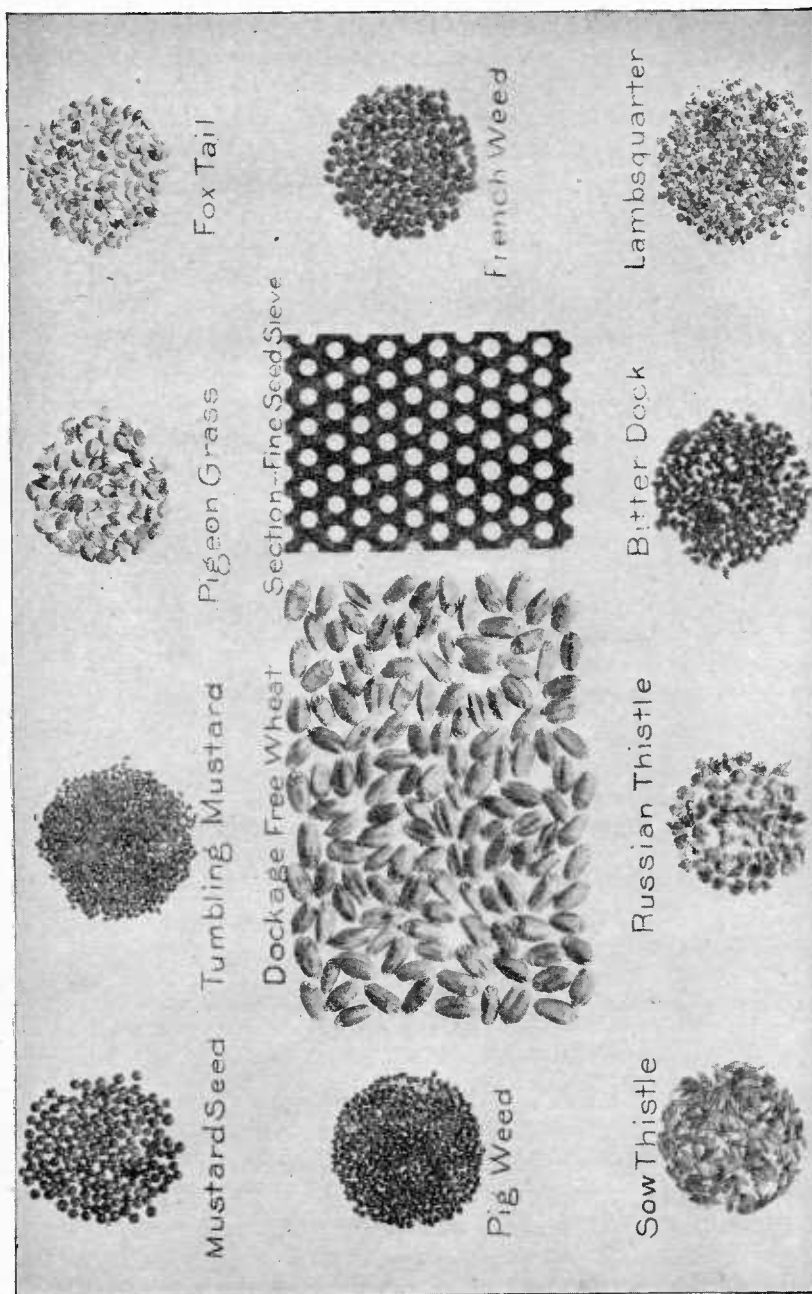


FIG. 3.—Some of the common small weed seeds (actual size) found in wheat and generally considered "Dockage." These seeds are usually separated by the fine seed sieve with round perforations one-twelfth inch in diameter. Pig weed, Russian thistle, and lambsquarter are considered as having good feeding value, but, because of their small size, should be ground. Pigeon grass and fox tail are comparable to light millet for feed, while black and Chinese mustard are pungent, and tumbling mustard, French weed, and bitter dock are objectionable in feeds in any considerable quantity.

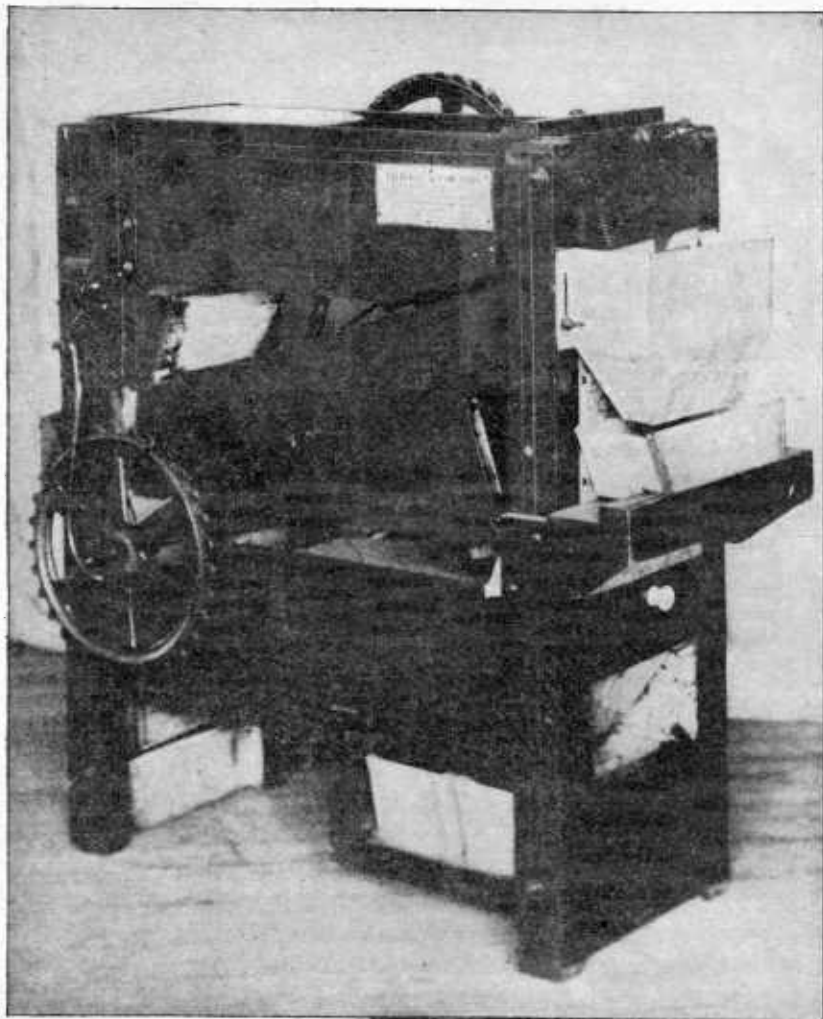


FIG. 4.—Wheat tester often used for removing coarse material in determining dockage. The tester is used to remove barley, oats, wild oats, pieces of straw, weed stems, and other coarse material from wheat. This is a modified form of a machine which had been in use in the spring wheat belt, where the dockage system has been practiced for years. The sample is placed in the hopper in the top (left), from which it flows slowly upon a riddle. The riddle is caused to have a series of short, jerky motions by means of the turning of the wheel shown at the rear of the machine. On account of this peculiar short, jerky motion of the riddle, this machine has been popularly designated as the "wild-oat kicker." The coarse material is "kicked" up each step of the riddle until it falls into the hopper and pan on the right side near the top of the machine, while the wheat grains and fine material are separated by falling through onto a sieve and into the pans below. The fine material is separated from the wheat as the sample passes over the sieve.

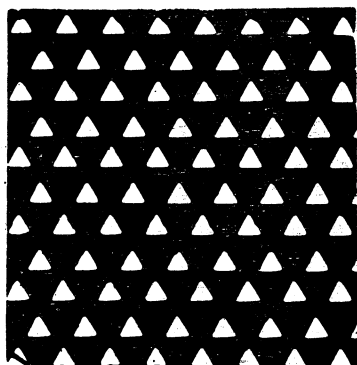
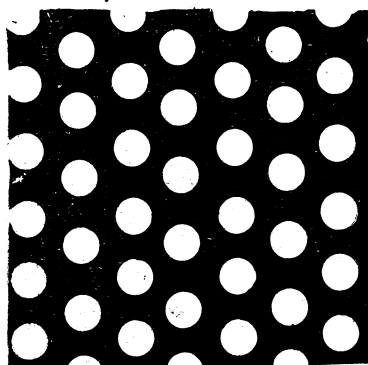
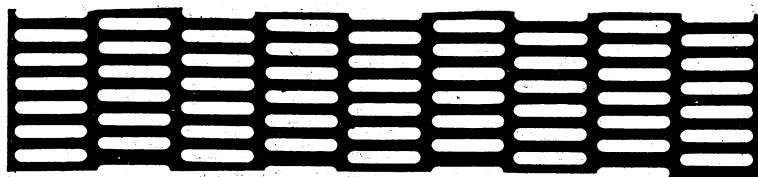
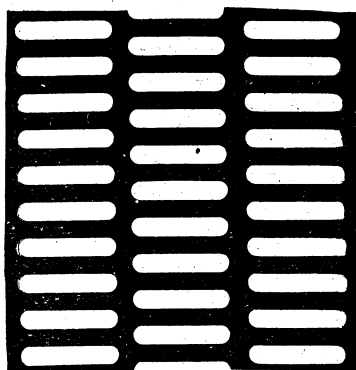
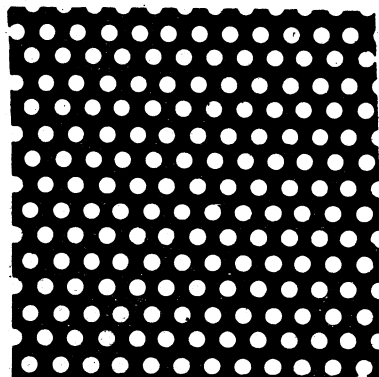
*BUCKWHEAT SIEVE**SCALPER SIEVE**FINE CHESS SIEVE**COARSE CHESS SIEVE**FINE SEED SIEVE*

FIG. 5.—Sections of dockage sieves illustrating the perforations (actual size) of the sieves. Buckwheat sieve, triangular perforations $\frac{3}{16}$ inch long on each side of perforation; scalper sieve, round perforations $\frac{3}{16}$ inch in diameter; fine chess sieve, slotted perforations 0.064 inch wide by $\frac{3}{8}$ inch long; coarse chess sieve, slotted perforations 0.070 inch wide by $\frac{1}{2}$ inch long; fine seed sieve, round perforations $\frac{1}{16}$ inch in diameter.

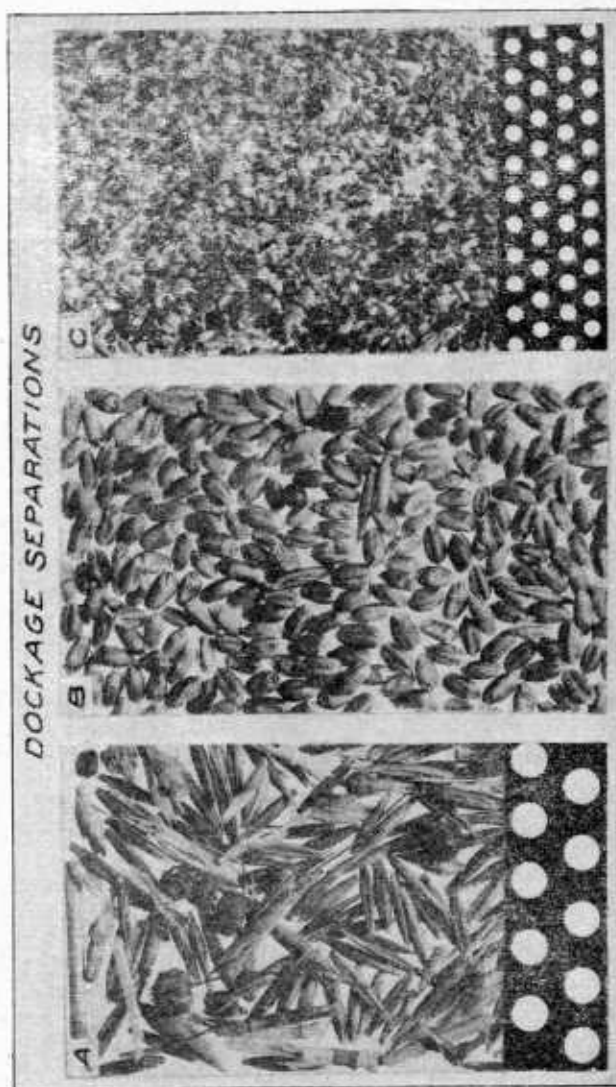


FIG. 6.—Separations made and sections of sieves used (actual size) in determining dockage when the separable foreign material consists of only oats, chaff, straw, weed stems, and similar coarse material, and sand, fine seeds, and similar fine material. A, Section of scalper sieve and character of material separated; B, dockage-free wheat; C, section of fine seed sieve and character of material separated. The material separated as shown in A and C together comprises the dockage.

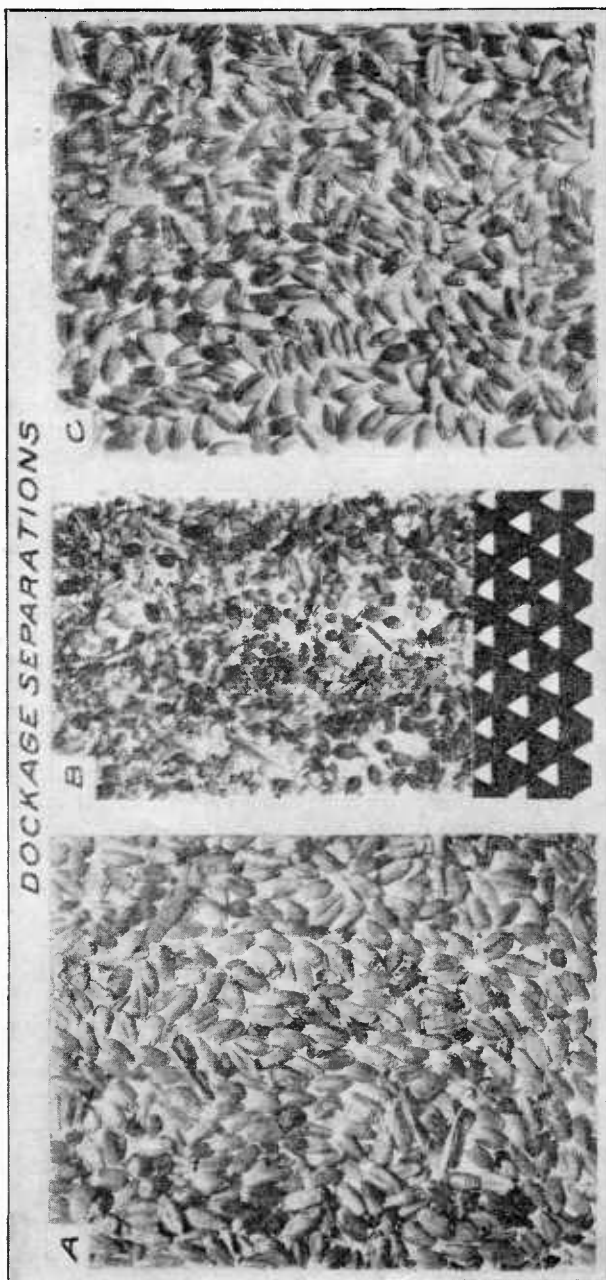


FIG. 7.—Separation made and a section of the sieve used (actual size) in determining dockage when the wheat contains only wild buckwheat and other foreign material, the pieces of which are sufficiently small to enable them to pass readily through the triangular perforations. A, Character of the sample before the removal of the dockage; B, section of buckwheat sieve and character of the material separated; C, character of dockage-free sample. Sometimes a certain amount of cracked wheat is also separated in the first screening of the sample, and in such cases it is necessary to carefully rescreen the material separated in order to recover as much of the cracked wheat to the sample as is practicable.

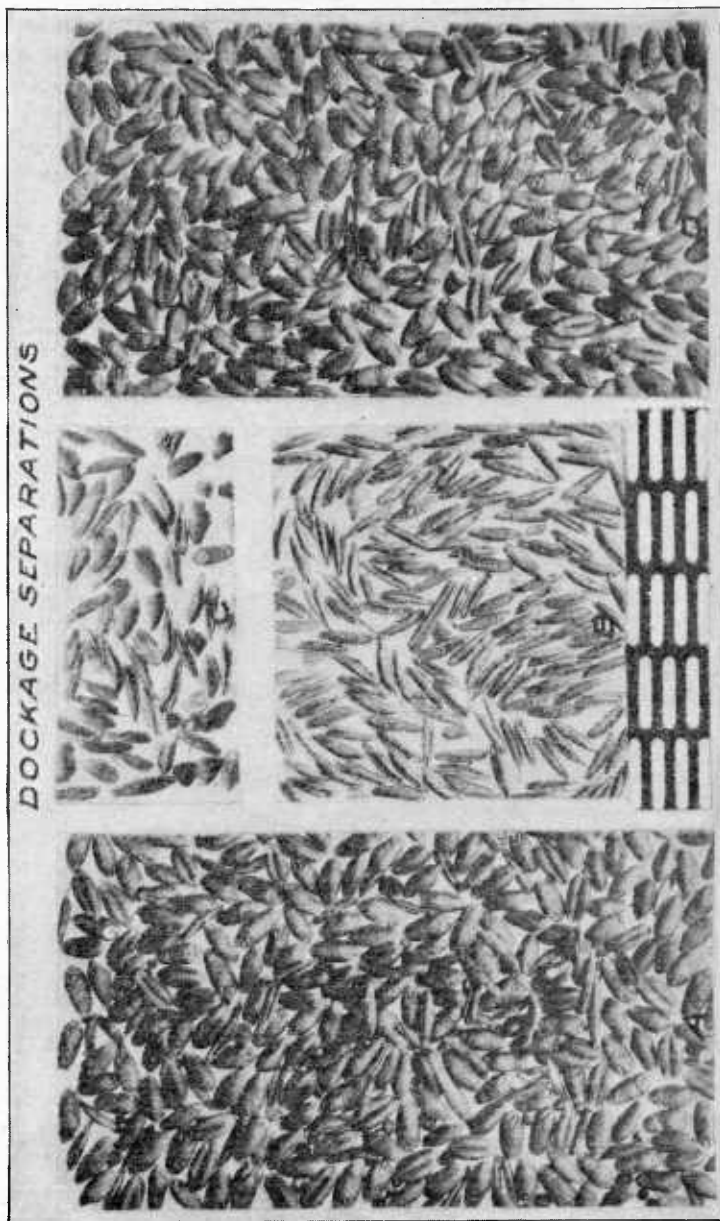


FIG. 8.—Separation made and a section of the sieve used (actual size) in determining dockage when the wheat contains only chaff (cheese). A, Character of the sample before the removal of dockage; B, section of the fine cheese sieve, and the character of the material, including small shriveled or split wheat kernels, which is recovered to the wheat by carefully rescreening the material separated in the first screening (in rescreening the material first separated to recover the small shriveled or split kernels, some of the foreign material is also recovered); C, character of the dockage-free wheat.

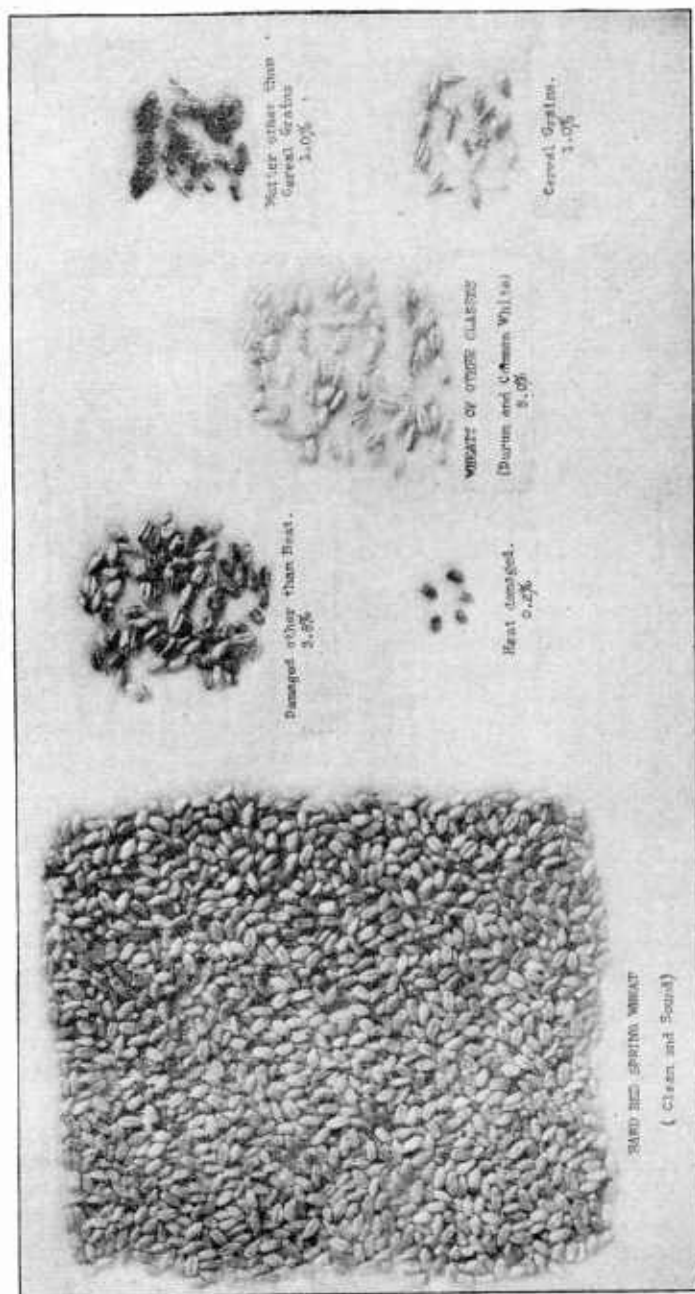


FIG. 9.—Separations illustrating various grading factors, including "Foreign material other than dockage" ("Cereal grains," and "Matter other than cereal grains"). This dockage-free sample contains the maximum percentages of the factors shown, that are permitted in the No. 2 grade.

All material passing through the buckwheat sieve should be considered as dockage, except that whenever the screenings removed by this sieve consist of an appreciable quantity of small shriveled kernels of wheat, the material so removed should be rescreened over the same sieve.

In the rescreening, the material should be carefully deposited at one edge of the sieve, then while holding the sieve at an angle of 25 or 30 degrees, it should be tapped lightly until all material has passed either to the opposite edge of the sieve or through the perforations. If operated properly, the material at the opposite edge of the sieve will consist mainly of wheat and should be classed as wheat and not as dockage.

The material that passes through the sieve will consist mainly of wild buckwheat and other weed seeds, together with a small percentage of shriveled kernels and small broken pieces of wheat, and these should be classed as dockage. In exceptional cases it may be necessary to repeat the rescreening in order to arrive at an equitable determination of the percentage of dockage.

The chess sieves should not be used unless the sample in question contains an appreciable quantity of chess (cheat). (See fig. 8.) As a general rule, the chess sieves should likewise not be used until after the sample has been screened, either over the fine-seed or the buckwheat sieve, as the sample may require. Whenever it is necessary to screen for chess, the fine chess sieve with perforations 0.064 by $\frac{3}{8}$ inch should be used, except when the sample consists of wheat of large kernels mixed with large chess seeds. Large chess seeds in a sample of wheat consisting mainly of small kernels of wheat from which the chess can not be separated readily should be considered as "Foreign material other than dockage," and the sample should be handled and graded accordingly.

Whenever in the use of chess sieves the screenings consist of an appreciable quantity of small shriveled or split kernels, the material so removed should be rescreened over the same sieve, manipulating it as described for rescreening over the buckwheat sieve. In rescreening over the chess sieve, the material should flow with and not across the slots.

The scalper sieve is to be used for removing coarse foreign material. Any thrashed wheat kernels that remain on the scalper sieve should be picked out and returned to the wheat and should not be considered as dockage.

The dockage thus determined will consist, therefore, of the coarse foreign material in addition to the finer screenings obtained by hand sieving. Since any foreign matter remaining in the wheat after the

removal of dockage is considered as "Foreign material other than dockage," and consequently directly affects the grade, great care should be used in sieving the samples.

TEST WEIGHT DETERMINED ON DOCKAGE-FREE WHEAT.

The Federal grades provide that each determination of dockage, moisture, temperature, odor, onions, garlic, and live weevils or other insects injurious to stored grain shall be upon the basis of the grain including dockage. All other determinations shall be upon the basis of the grain when free from dockage. Since the test weight per bushel is one of the main factors in determining the grade, the dockage should be determined with a sufficient quantity of the original sample to provide at least enough dockage-free wheat for making the test weight with a pint tester, and preferably the dockage should be removed from a sufficient quantity of wheat for obtaining the test weight with a quart tester. The offices of Federal Grain Supervision have instructions to make the weight per bushel test with a quart tester. (See fig. 10.) Under average conditions a sample of 1,000 grams (about 2¼ pounds) will be a sufficient amount for determining the test weight with a quart tester. However, if the wheat contains a large amount of coarse material and other foreign matter, it will sometimes be necessary to remove the dockage from more than 1,000 grams, in order to secure a sufficient quantity of dockage-free wheat to make the test weight with a quart tester.

GRADING THE DOCKAGE-FREE SAMPLE.

After the dockage is removed from the original sample and the test weight per bushel has been determined, the sample is then examined to ascertain if an analysis is to be made for any other factors provided for in the Federal standards that will determine the grade. (See fig. 9.) While provision is made in the standards for many factors that affect the quality and condition of wheat, the actual practice of grain inspectors is to make the test for only the factor or factors that are necessary to determine the grade for any one sample. An experienced grain man is able to ascertain generally the factor or factors that must be accurately determined. Therefore, if the dockage-free sample is found to have considerable foreign material present that will cause it to be a grading factor, the sample is reduced in size by thoroughly mixing and dividing it, preferably in the Boerner sampling device, to a size of approximately 50 grams (about 2 ounces), to permit of rapid analysis. This small portion or subsample is then weighed, and the foreign material is taken out of

the sample by hand picking. The "Matter other than cereal grains" (weed seeds, dirt, and similar material not separated as dockage) is placed together, and the "Cereal grains" (rye, barley, oats, etc.) are placed together. The "Matter other than cereal grains" is weighed first, because it is specially considered in the grades, and the percentage, by actual weight, is determined. Then the "Cereal grains" are weighed and the percentage determined, in order to ascertain the total "Foreign material other than dockage" in the sample. If, for example, the "Matter other than cereal grains" equals one-half of 1 per cent, then only one-half of 1 per cent of "Cereal grains" may be allowed in the sample if the wheat is to grade numerically No. 1, for the total "Foreign material other than dockage" must not exceed 1 per cent. If, however, there is no "Matter other than cereal grains" in the sample, 1 per cent or all of it may consist of "Cereal grains" and still grade numerically No. 1. This same procedure is maintained for each grade, except that the percentages are increased for the lower grades.

PRACTICAL METHODS OF HANDLING DOCKAGE.

All of the following methods of handling dockage are employed in normal times and all are generally found to be satisfactory:

1. The wheat is cleaned on the farm and only the clean wheat is hauled to market.
2. The wheat delivered by the farmer is run over the proper cleaning machinery at the country elevator or mill, and the dockage is separated and returned to the farmer.
3. The wheat is screened by the local buyer, payment is made to the seller on the basis of the grade of the clean wheat only, and the dockage is retained by the elevator or mill as compensation for services in removing it.
4. The wheat is screened by the local buyer, payment is made to the seller on the basis of the grade of the clean wheat, and the dockage is retained by the elevator or mill, and if the value of the dockage separated exceeds the cost of separation, payment is made for it.
5. The wheat containing the dockage is consigned to the large market by the country mill or elevator, where the dockage is separated and its value is taken into consideration in connection with the price paid for the entire carload of dockage-free wheat. In some localities it is the practice to make a small charge for such services, while in other localities the services are performed without cost.
6. The wheat containing the dockage is sold to a local buyer, who in turn consigns it to the terminal market with the understanding that the price secured will be based upon the commercial value of both the wheat and the dockage.

The first two methods mentioned, in which only the screened wheat is delivered to the local buyer, tend to minimize the differences of opinion with regard to the grade of wheat delivered and therefore

establish greater confidence in the grades given by the local buyer. Furthermore, these methods enable the farmer to utilize the foreign material for feed or to sell it locally. When noxious weed seeds are present, it is advisable to have the removed dockage ground before feeding, to prevent the further spread of these weeds on the farm. In many cases such material has a relatively high value as feed, and it is believed that farmers will often find it to their advantage to remove the dockage themselves or to have their local buyers do it for them, even though it may be necessary to pay a small fee for the service.

When the dockage is separated by the local buyer and is retained by him as compensation for the extra labor involved, as well as for compensation for the additional time and equipment necessary to perform this service, as noted in the third method mentioned, it may be accumulated at the elevator or mill and disposed of by shipping to a terminal market in bulk, or, in cases of small accumulations, it may be sacked and sold locally for feed. The entire factor of dockage in farmers' cooperative elevators where each farmer is financially interested may be handled by this method. It means, of course, that any material of value in the dockage can be disposed of advantageously and the proceeds prorated at the end of a season's business among the farmers interested in the elevator.

When wheat containing dockage is consigned to a commission merchant at a terminal market, as noted in the sixth method mentioned, the commission merchant, under normal marketing conditions, will sell the wheat by exhibiting a sample on the exchange floor, or by some other method, and secure the best possible price for the grain contained in the car. Consideration is given not only to the value of the wheat itself but to the wheat plus the dockage, provided, of course, the dockage is composed of material having some commercial value. It is not unusual for a certain lot or parcel of wheat to contain a comparatively high percentage of dockage of this character. It should be the function and duty of the commission merchant at the terminal market to obtain the largest returns possible under the conditions.

A FEW IMPROPER METHODS OF APPLYING DOCKAGE.

The dockage system of the Federal standards was used in certain localities for the first time when the standards became effective. Because many farmers and country buyers were not familiar with the application of the new dockage system, the results were that in these localities the country buyers were often using improper methods of determining or applying dockage in the grading. A few of these

improper methods which have come to the attention of the Department of Agriculture will be cited to illustrate.

An improper method used by dealers in some parts of the country was to determine the percentage of dockage and arbitrarily deduct this percentage from the weight of the grain purchased. This was done regardless of the value of the material separated. Sometimes this dockage was then returned to the sample, and the buyer determined the test weight per bushel on the basis of the wheat containing the dockage. This method is not in accordance with the Federal grading rules and may tend to decrease the test weight per bushel. In other instances a deduction was also made for foreign material present in the sample, including the material that had been separated previously as dockage, calculating the same material as a factor twice.

In other localities, a dockage assessment of 1 bushel per load of approximately 60 bushels was made regardless of the percentage of dockage present. It is evident that the practice of making an arbitrary assessment of dockage is unjust to the farmer and not only encourages the marketing of the wheat containing weed seeds and other separable foreign material but also greatly discourages the general improvement in marketing conditions and good farming methods.

SECURING INFORMATION RELATIVE TO DOCKAGE.

Further information as to the correct method of determining dockage in wheat may be obtained by writing the Department of Agriculture, Washington, D. C., or by writing to or visiting the nearest Office of Federal Grain Supervision. Offices of Federal Grain Supervision are located in the large grain markets.

A farmer or country grain dealer may also mail to the nearest licensed grain inspector a sample of wheat and receive, for a small fee, an official certificate showing the grade and the dockage on that particular sample. This sample should be at least 2 quarts in size, of which at least $1\frac{1}{2}$ pints is inclosed in a clean air-tight container, and the remainder, if any, together with the container, should be placed in a clean cloth sack. The name and address of the nearest licensed grain inspector can be secured by writing to the Department of Agriculture or to any supervision office.

TABULATED AND ABRIDGED GRADE REQUIREMENTS, OFFICIAL GRAIN STANDARDS OF THE UNITED STATES FOR WHEAT.

[The numbered footnotes below must be read in connection with the tabulation.]

Grade No.	Minimum limits of test weight per bushel.			Maximum limits of—						
				Moisture.		Damaged kernels.		Foreign material other than dockage.		Wheats of other classes.
	Class Hard Red Spring.	Classes Durum, Hard Red Winter, Common White, and White Club; and subclass Red Winter.	Sub-class Red Walla.	Classes Hard Red Spring and Durum.	Classes Hard Red Winter, Soft Red Winter, Common White, and White Club.	Total.	Heat damage.	Total.	Matter other than cereal grains.	Total.
	Lbs.	Lbs.	Lbs.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
1.....	58	60	58	14.0	13.5	2	0.1	1	0.5	5
2.....	57	58	56	14.5	14.0	4	0.2	2	1.0	10
3.....	55	56	54	15.0	14.5	7	0.5	3	2.0	10
4.....	53	54	52	16.0	15.5	10	1.0	5	3.0	10
5.....	50	51	49	16.0	15.5	15	3.0	7	5.0	10
Sample*										

* *Sample grade.*—Shall be wheat of the appropriate subclass which does not come within the requirements of any of the grades from No. 1 to No. 5, inclusive, or which has any commercially objectionable foreign odor, except of smut, garlic, or wild onions, or is very sour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality, or contains small, inseparable stones or cinders.

- (1) The wheat in grade No. 1 shall be bright.
- (2) The wheat in grades Nos. 1 to 4, inclusive, shall be cool and sweet.
- (3) The wheat in grade No. 5 shall be cool, but may be musty or slightly sour.
- (4) The wheat in grade No. 1 Dark Northern Spring and grade No. 1 Northern Spring may contain not more than 5 per centum of the hard red spring wheat variety Humpback.
- (5) The wheat in grade No. 1 Amber Durum and grade No. 1 Durum may contain not more than 5 per centum of the durum wheat variety Red Durum.
- (6) For each of the subclasses of the class Durum, grade No. 1 and grade No. 2 may contain not more than 2 per centum and 5 per centum, respectively, of soft red winter, common white, and white club wheat, either singly or in any combination.
- (7) For each of the subclasses of the classes Hard Red Spring and Hard Red Winter, grade No. 1 and grade No. 2 may contain not more than 2 per centum and 5 per centum, respectively, of common white, white club, and durum wheat, either singly or in any combination.
- (8) For each of the subclasses of the classes Soft Red Winter, Common White, and White Club, grade No. 1 and grade No. 2 may contain not more than 2 per centum and 3 per centum, respectively, of durum wheat.

NOTE.—For grades for Mixed wheat, Treated wheat, Garlicky wheat, and Smutty wheat see sections Nos. 21, 22, 23, and 24, respectively, of the official grain standards of the United States for wheat.

The above tabulation does not constitute in whole the official grain standards of the United States for wheat.



FIG. 10.—Standard method of determining the test weight per bushel.¹ The test weight per bushel is determined on the dockage-free wheat. The wheat is poured into the quart kettle from a funnel, the opening of which is $1\frac{1}{4}$ inches in diameter and 2 inches above the top of the kettle. The excess grain is stroked off by means of three zigzag motions with the sides of the special wood stroker, with round edges, held vertically.

¹ NOTE.—The quart tester shown in figure 10 is described in detail in U. S. Department of Agriculture Bulletin 472, together with the standard method of making the test. This tester has been adopted as the official tester and is being used by the department in connection with the enforcement of the United States grain standards Act. (The special stroker should be of hardwood, $\frac{3}{8}$ inch thick, $1\frac{1}{4}$ inches broad, and 12 inches long, each edge being a perfect half circle.)

POST-OFFICE ADDRESSES OF OFFICES OF FEDERAL GRAIN SUPERVISION.

Atlanta, Ga.:	Minneapolis, Minn.:
1712 Citizens and Southern Bank Bldg.	326 Flour Exchange.
Baltimore, Md.:	Nashville, Tenn.:
610 Keyser Bldg.	807 Independent Life Bldg.
Boston, Mass.:	New Orleans, La.:
Room 1140, 141 Milk St.	504 Pan-American Bank Bldg.
Buffalo, N. Y.:	New York, N. Y.:
98 Dun Bldg.	Room 1607, 27 William St.
Cairo, Ill.:	Oklahoma City, Okla.:
Room 6, Postoffice Bldg.	502 Patterson Bldg.
Chicago, Ill.:	Omaha, Nebr.:
General Field Headquarters,	738 Brandeis Bldg.
1132, 327 South La Salle St.	Peoria, Ill.:
Chicago, Ill.:	509 Lehmann Bldg.
District Supervisor's Office, 970,	Philadelphia, Pa.:
208 South La Salle St.	578 Bourse Bldg.
Cincinnati, Ohio:	Portland, Oreg.:
210 Johnston Bldg.	519 Postoffice Bldg.
Cleveland, Ohio:	San Francisco, Calif.:
709 Illuminating Bldg.	1131 Merchants Exchange.
Denver, Colo.:	Seattle, Wash.:
509 Cooper Bldg.	2304 L. C. Smith Bldg.
Duluth, Minn.:	Sioux City, Iowa:
Rooms 1-4, Sherwood Bldg.	335-338 Grain Exchange Bldg.
Fort Worth, Tex.:	Spokane, Wash.:
511 First National Bank Bldg.	516 Chamber of Commerce.
Galveston, Tex.:	St. Joseph, Mo. (substation of Kansas City):
222 Security Bldg.	1008 Corby-Forsee Bldg.
Indianapolis, Ind.:	St. Louis, Mo.:
827 Board of Trade Bldg.	817 Pierce Bldg.
Kansas City, Mo.:	Tacoma, Wash. (substation of Seattle):
310 Postal Telegraph Bldg.	138 Perkins Bldg.
Louisville, Ky.:	Toledo, Ohio:
27 Board of Trade Bldg.	2009 Second National Bank Bldg.
Memphis, Tenn.:	Wichita, Kan.:
403 Exchange Bldg.	313 Sedgwick Bldg.
Milwaukee, Wis.:	
821 Railway Exchange Bldg.	

